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# Incorporating Peak Demand Reduction in a National Energy Savings Initiative

2nd Australian Summer Study
Australian Alliance to Save Energy
27 February – 1 March 2013, Sydney

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# Why would incorporating peak demand reductions help?

- The objective of existing energy savings initiatives have generally involved:
  - Increasing energy efficiency, decreasing consumption
  - Reducing greenhouse gas emissions
  - Helping customers reduce electricity bills, to some extent to assist in the run up to the introduction of a carbon price
  - Activating the market for energy services
- Assessment of the early years of the 3 existing state-based programs (VEET, NSW ESS and SA REES) suggests that the programs, while small, have:
  - Produced material benefits for program participants
  - Had a modest downward impact on wholesale prices
- But have put upward pressure on the unit price of delivered electricity
  - This is primarily due to the fact that the programs reduce overall supply chain revenue more than they reduce supply chain costs
  - As a result, all other things being equal, a customer that does not participate in the program is likely to experience an increase in their unit price of electricity and their bill
  - This could have inequitable or regressive distributional effects despite the programs being accessible to a wide cross-section of all electricity users
  - Program designs such as used in the REES provide some mitigation of this by setting a target for low-income participation within the overall program target

# Why would incorporating peak demand reductions help? (2)

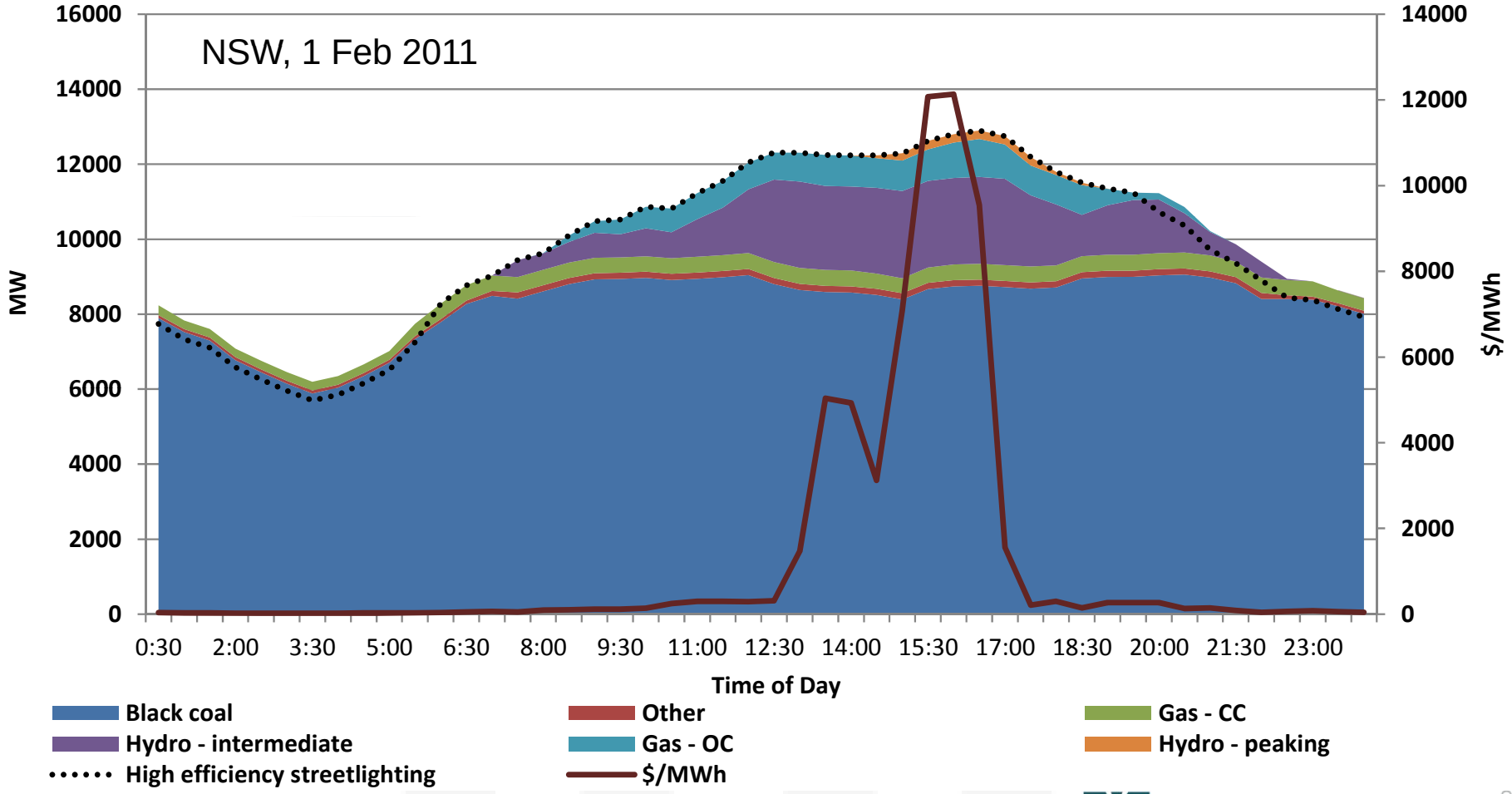
- This does not mean that energy efficiency and reducing greenhouse gas emissions are not good ideas – they are, but they are not the only things to consider
- Impacts of programs on electricity prices in the near term are particularly contentious at present due to the significant increases in electricity prices that have occurred over the past five years or so and the pressure that has put on the community, politicians, policymakers, regulators and the industry
- Addressing this requires consideration of the impact of energy efficiency programs on load factor
  - Peak demand impacts as well as total annual energy savings
  - This has generally not been considered in the design of ESIs
- The Commonwealth Government expressed interest in incorporating peak demand reduction into the design of a national Energy Savings Initiative
  - ***because*** it recognised that doing so represents the surest and quickest means for putting downward pressure on electricity prices

# How can energy efficiency increase electricity price?

- Load factor is a key metric related to the cost of meeting aggregate consumer demand
- Load factor is the ratio of average demand to peak demand
  - The lower the ratio, the 'peakier' the load profile
  - The peakier the load factor the greater the proportion of low duty-cycle assets (generation and networks) in the system, which will require higher unit electricity prices in order to recover total system costs
- Where energy efficiency increases load factor, it will put downward pressure on electricity price
- Where it reduces load factor, it will put upward pressure on electricity price
- The impact of an energy efficiency program on load factor is product of:
  - the load profile of the electricity system prior to the energy efficiency program
  - the specific mix and proportion of the particular energy efficiency measures taken up in each program
- This proportion is almost certain to change from year to year as:
  - Different measures become eligible for incentives under the program, reach saturation or are removed from eligibility, or become attractive due to price changes or saturation/removal
  - Programs are opened to additional market sectors

# High Efficiency Street Lighting (stylised example)

- Makes the load shape peakier, but does reduce greenhouse gas emissions from coal and gas



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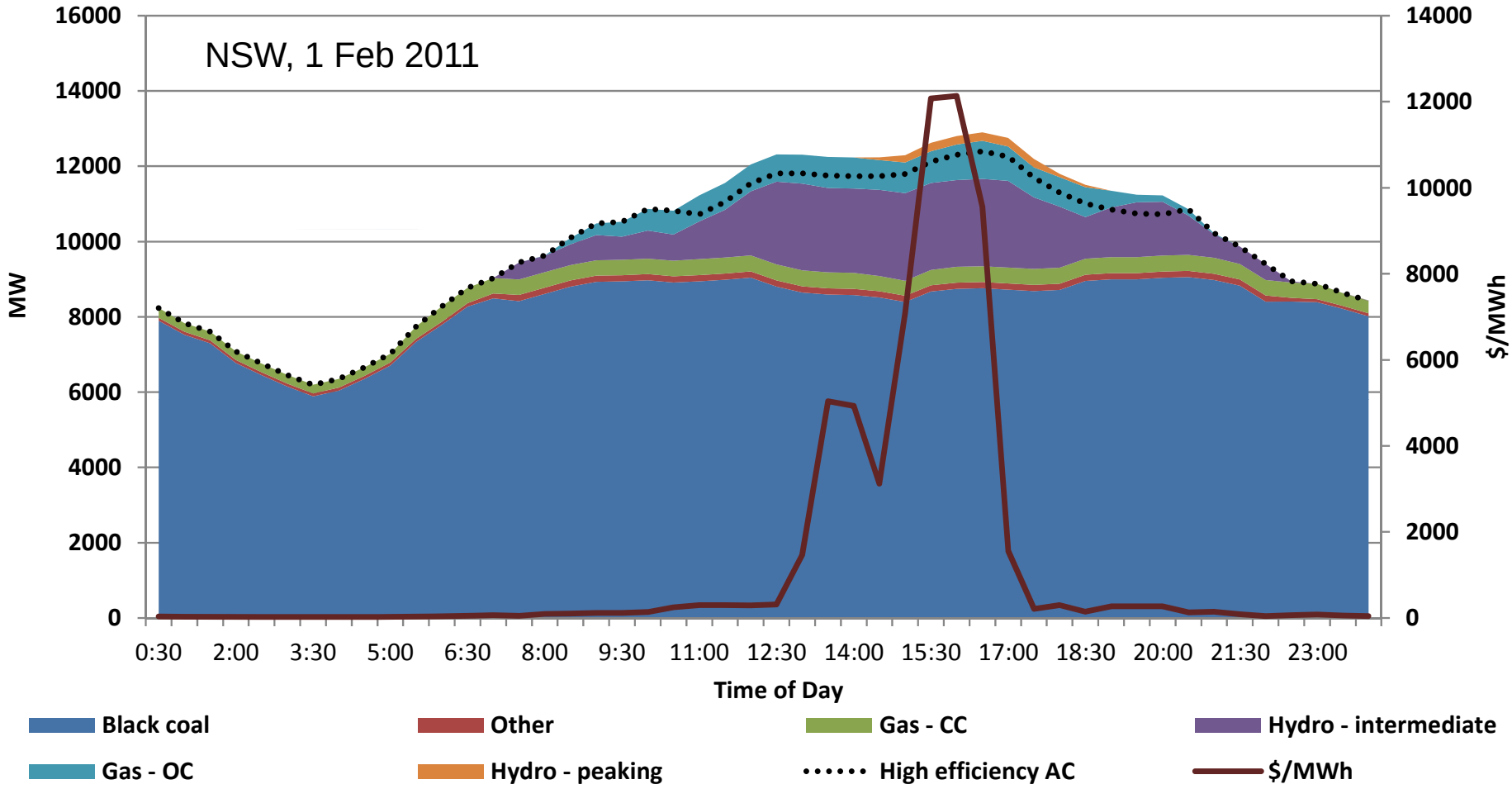
# High Efficiency Air Conditioner (stylised example)

- Makes the load shape flatter, but backs down hydro electricity and gas



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# Key design issues for incorporating peak demand

- Generation or network peak demand (or both)?
  - Demand reductions anywhere in the NEM or focus on areas facing near-term augmentation
- Timeframe over which benefits accrue
  - Focus on near-term economic benefit or longer term impact
- Dispatchable or enduring (or both)?
  - Things we can make happen when we want (and possibly where we want)
  - 'Permanent' changes to the load duration curve (which may entail consumption reductions or additions outside peak demand periods)
- Who should be obligated (assuming an obligation is placed)
  - Retailers? Networks? Both?
- Transparency of impact
  - Will the demand reduction capability or impact be visible to the market or to network planners?
- Degree to which it promotes a more active demand side to the market
- Impact on greenhouse gas emissions, reliability and security of supply

# Options for incorporating peak demand reductions in or in parallel with a national ESI

- Option 1: Peak Energy Savings Incentive
  - Mechanism to increase the number of certificates for energy efficiency measures that improve load factor and reduce the number of certificates for those that reduce it
  - The only one of the options that has been assessed in any depth – DCCEE modelling of a national ESI
- Option 2: Stand-alone Peak Energy Savings Target Scheme
  - A separate target and certificate program for peak demand reductions
  - Retailers or networks could be the obligated party
- Option 3: Central Buyer Scheme
  - A separate, central entity would purchase and (where appropriate) exercise demand reduction
  - Could focus on demand response (callable/dispatchable) or reduced consumption at peak times through higher efficiency end-use technologies
  - ***not*** a certificate program
- Option 4: Regulatory Incentives

# Option 1: Peak Savings Initiative

| Key Characteristics |
| --- |
| Enhanced incentive for peak savings as part of a national energy savings scheme with an obligation on retailers:<br>• additional certificates for peak savings<br>• reduced certificates for savings that reduce load factor<br>• (possibly) a minimum target for peak savings |
| Energy savings businesses have access to a market to create energy savings certificates with additional value for peak savings |
| Costs of scheme passed through to customers through higher retail charges |
| Benefits accrue to customers in the longer term through lower network charges and wholesale costs |
| Incentive for energy savings businesses to work with network businesses to achieve network deferral |
| No change to incentives for network businesses |

| Advantages |
| --- |
| Easy to implement and relatively low ongoing administrative costs |
| Administrative burden limited to retailers |
| Provides an additional incentive to lower peak demand and can ensure that energy efficiency outcomes do not erode system load factor, thereby reducing the net public benefit of the scheme |
| Creates a 'market' for peak energy savings, thereby encouraging development of energy savings businesses |

| Disadvantages |
| --- |
| Potential lack of alignment between location of peak savings and need for network deferral |
| Requires energy savings businesses to work with networks to realise network deferral benefits |
| The timing of costs and benefits of the scheme are unlikely to align |

# Option 2: Stand-alone Peak Savings Target Scheme

| Key Characteristics |
| --- |
| Stand-alone peak energy savings target scheme, obligation could be placed on:<br>• network businesses instead of retailers, or<br>• added to the energy efficiency obligation on retailers |
| Energy savings businesses have access to a market to create both peak and general energy savings certificates |
| Costs of scheme passed through to customers through a combination of higher retail and network charges (offset in part by network cost savings) |
| Benefits accrue to customers in the mid to longer term through lower network charges and wholesale costs |
| Potential incentive for energy savings businesses to work with network businesses to achieve network deferral |
| Could create an obligation for network involvement in peak demand reduction at either the global or area-specific level |

| Advantages |
| --- |
| Easy to implement and potentially relatively low ongoing administrative costs |
| Provides an additional incentive to lower peak demand |
| Creates a 'market' for peak energy savings, thereby encourages development of energy savings businesses |
| Allows innovative network businesses to receive additional revenue for engaging in demand programs that result in network investment deferral (though that revenue could be clawed back through the regulatory process) |

| Disadvantages |
| --- |
| Potential lack of alignment between location of peak savings potential and need for network deferral |
| Potentially no additional incentive on network businesses to deliver network deferral benefits |
| Requires energy savings businesses to work with networks to realise network deferral benefits |
| The timing of costs and benefits of the scheme are unlikely to align |

# Option 3: Central Buyer Scheme

| Key Characteristics |
| --- |
| An entity is given responsibility for managing peak demand |
| Single buyer could fulfil its responsibilities in a number of ways, including:<br>• contracting with third parties to provide peak demand savings into the future<br>• stand in the market offering to purchase all peak savings at a fixed price<br>• purchase and control demand management systems to flatten wholesale and/or network peaks |
| Energy savings businesses have access to a market to deliver peak savings |
| Costs of scheme passed through to customers through a direct levy or funded from consolidated revenue |
| Benefits can accrue to customers relatively quickly through reduction of spot price excursions that flow through to the contract market, and over the longer term through lower network charges and wholesale costs over time |

| Advantages |
| --- |
| Allows energy savings businesses to work with the single buyer to identify and implement energy savings programs |
| Places a direct focus on the management of demand to minimise the cost of energy supply over the short, medium or long term |
| Provides flexibility to be adaptive to changing circumstances and improved understanding of opportunities and risks arising from energy savings programs |

| Disadvantages |
| --- |
| High establishment and ongoing administrative costs |
| The timing of costs and benefits of the scheme are unlikely to align |
| A very ‘non-market’ mechanism |

# Option 4: Regulatory Incentive Options for Networks

| Incentive payment for improvement in top-end load factor | Capitalisation of demand reduction expenditures |
|---|---|
| Provide a regulatory incentive (e.g., higher WACC or increase to AARR) for improvement of the load factor of the top 100 – 200 hours by some threshold amount where a plan for doing so was included in the revenue proposal | Allow network company to earn a return on demand reduction expenditures |
| Advantages:<br>• Harnesses incentive power for a defined improvement – similar to the STPIS | Advantages:<br>• Relatively simple to administer<br>• Overcomes a major barrier<br>• Could be combined with a target<br>• Use of demand reduction to meet area-specific demand would still need to meet least-cost scrutiny |
| Issues that would need to be addressed:<br>• Determining threshold<br>• Establishing a timeframe to avoid saw-tooth outcomes<br>• Normalising for a variety of factors including weather, spot loads, impacts of other mechanisms etc<br>• Should a penalty be included | Issues that would need to be addressed:<br>• Acceptability of capitalisation from the accounting and regulatory perspectives<br>• Focus: global or network deferral only<br>• Interaction with reliability standards at least initially |
| Costs passed through to consumers as part of regulated distribution charges – but would only be incurred if top-end load factor improved | Costs passed through to consumers as part of regulated distribution charges |
| Benefits accrue to customers through lower network charges and wholesale costs over time | Benefits accrue to customers through lower network costs within the regulatory cycle; wholesale market impacts could provide additional benefits |

# Concluding remarks

- Energy efficiency and peak demand reduction programs put downward pressure on wholesale electricity price when they are first introduced
  - As consumption is reduced at the top end of the load duration curve, competition for dispatch may reduce price temporarily
  - Consumption reductions will push back the time at which new capacity is needed
  - Once excess capacity is absorbed, however, the unit price for that portion of the LDC will return to its former level
- A sustained change in wholesale price will result only where changes in demand-side load shape change the location of the inflection points of the LDC
  - Where this happens there will be a change in the proportion of hours and energy generated by different parts of the merit order, thereby changing average wholesale price

# Concluding remarks (2)

- In networks, while every reduction in peak demand has an economic value at some point in time, impacts on current system costs require that the change in load shape must:
  - Consistently and reliably reduce absolute peak demand in areas in which augmentation has been included in the distributor's annual revenue requirement and price determination
  - And must reduce that peak demand by the amount needed for the system element to remain within its capacity limit
  - Where energy efficiency reduces throughput without reducing peak demand (or without reducing peak demand sufficiently), it will reduce revenue (under current pricing approaches) and put upward pressure on unit prices
- In summary:
  - Energy efficiency measures that reduce peak demand are worth more than those that don't
  - Additional benefit can be provided including by dispatchable DR in program designs
    - Manage 'lumpy' problems such as wholesale market price excursions and area-specific peak demands
    - Compensate for energy efficiency actions that reduce system load factor

# Recommendations

- Integrating DR with EE measures can help mitigate deleterious market outcomes. Possible approaches:
  - Load factor correction of incentives
  - Targets based on load-factor corrected certificates
  - Offsetting actions (e.g., contracted DSP)
- Governments should consider in program design:
  - The load shape changes of these programs & the impact of those changes on wholesale and network prices
  - The impact of any price increases on non-participants and specific customer segments (e.g., vulnerable customers) should be considered in program design – dedicated programs can ensure these customer segments obtain a proportion of program benefits
- Reliable information on the load shape impacts of the various candidate energy efficiency measures is lacking
  - Makes prediction of program impacts highly speculative
  - There is a real need for information on the diversified loadshape impacts of targeted energy efficiency measures

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